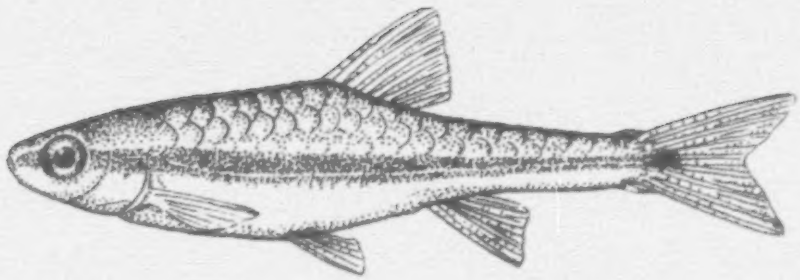
COSEWIC
Assessment and Update Status Report

on the

Pugnose Shiner
Notropis anogenus

in Canada



ENDANGERED
2002

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE IN
CANADA

COSEPAC
COMITÉ SUR LA SITUATION DES
ESPÈCES EN PÉRIL
AU CANADA

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Pugnose Shiner — Illustration from Scott and Crossman (1973). Used with permission by the authors.

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COSEWIC
Assessment Summary

Assessment Summary – November 2002

Common name
Pugnose Shiner

Scientific name
Notropis anogenus

Status
Endangered

Reason for designation
The Pugnose Shiner has a limited, fragmented Canadian distribution, being found only in Ontario where it is subject to declining habitat quality. The isolated nature of its preferred habitat may prevent connectivity of fragmented populations and may prevent gene flow between existing populations and inhibit re-colonization of other suitable habitats.

Occurrence
Ontario

Status history
Designated Special Concern in April 1985. Status re-examined and uplisted to Endangered in November 2002. Last assessment based on an update status report.

COSEWIC
Executive Summary

Pugnose Shiner
Notropis anogenus

Species Information

The Pugnose Shiner (Notropis anogenus Forbes, 1885) is a small silvery minnow with a dark lateral band extending from the tail forward onto the snout. Its mouth is very small and upturned. Females reach 6 cm and males reach 5 cm. The Pugnose Shiner is most similar to the Blackchin Shiner (Notropis heterodon), which can be distinguished by its larger mouth. The Pugnose Minnow (Opsopoeodus emiliae) also has a small upturned mouth but, unlike the Pugnose Shiner, has typically 9 dorsal rays, dark areas on the dorsal fin and crosshatched areas on the upper side.

Distribution

The Pugnose Shiner is found in the upper Mississippi River, Red River of the North, and Great Lakes basins. It is known from several tributaries of the Mississippi River in Illinois, Wisconsin and Minnesota. It has been documented from the Red River of the North drainage of Minnesota and North Dakota. In the Great Lakes drainage, it has been collected in marshes and tributaries of lakes Michigan and Huron, Lake St. Clair, western Lake Erie, eastern Lake Ontario and the upper St. Lawrence River. It has a spotty distribution in Michigan, Illinois, Wisconsin, New York and Ontario. It is now considered extirpated in Ohio.

In Canada, it is known from the Old Ausable Channel (southern Lake Huron drainage), Lake St. Clair, Lake Erie (Point Pelee, Rondeau Bay, Long Point Bay) and the St. Lawrence River between Eastview and Mallorytown Landing.

Habitat

In Ontario, the Pugnose Shiner is found in quiet areas of large lakes, stagnant channels, and large rivers primarily on sand bottoms with organic detritus. Water is usually clear and it is usually found in association with aquatic vegetation, particularly Chara.

Biology

The Pugnose Shiner is a timid and secretive fish that seeks cover among aquatic plants, which also provide food and breeding sites. Lifespan is probably only three years. Spawning occurs from mid-May to July at temperatures of 21-29°C. Gravid females may have up to 1275 eggs but may not lay all of these. Pugnose Shiners consume a variety of small plant and animal foods up to 2 mm in size. Its diet includes plants such as Chara and filamentous green algae (e.g., Spirogyra), cladocerans such as Daphnia, Bosmina and Chydorus, small leeches and caddisfly larvae.

Population sizes and trends

In Canada, the Pugnose Shiner has been recorded from six general locations and it is still established at four of these. It has not been collected In the St. Lawrence River near Gananoque since 1937, but was recently collected at sites east and west of this location. In Lake Erie it probably exists only in Long Point Bay where it was collected as recently as 1996. Despite more recent surveys, it has not been found at Point Pelee since 1941, or in Rondeau Bay since 1963. The Canadian Lake St. Clair populations, first discovered in the early 1980s, are most common in the open coastal marshes at the north end of the lake as exemplified by the capture of 281 individuals during an extensive survey of the Walpole Island marshes in 1999. It was first found in the Old Ausable Channel in 1983 and its continued presence was confirmed in 1997.

In the United States, population trends are uncertain. It continues to be collected at new sites but it has not been recorded from several early sites. Declines have apparently occurred in New York, Ohio, Michigan, Minnesota, Wisconsin and North Dakota.

Limiting factors and threats

Declines of the Pugnose Shiner have been attributed to increases in turbidity, loss of habitat from shore development and destruction of native near shore macrophytes. In Canada, parks on Point Pelee and Rondeau Bay that would presumably offer protection from habitat changes have failed to prevent its decline or extirpation. Potential limiting factors are unknown but could include habitat changes due to the introduced Eurasian Milfoil, Myriophyllum spicatum, and an increase in the number and diversity of predators and competitors.

Special significance of the species

Little is known of the ecological role of the rare Pugnose Shiner. Its strict habitat requirements makes it a good indicator of environmental quality.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.
** Formerly described as "Not In Any Category", or "No Designation Required."
*** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list.

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The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.

Update
COSEWIC Status Report

on the

Pugnose Shiner
Notropis anogenus

in Canada

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2002

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ABSTRACT

The Pugnose Shiner, *Notropis anogenus*, is a small member of the family Cyprinidae. It has a limited and disjunct distribution in the upper Mississippi River, Red River of the North and Great Lakes drainage basins. Recent collections indicate that reproducing populations are present in the Old Ausable Channel (southern Lake Huron drainage basin) and limited areas of the Canadian waters of Lakes Erie, Lake St. Clair and the St. Lawrence River. The species has apparently disappeared from two of the six known areas. The stability, size and range of the remaining four populations are poorly known. Therefore, it is recommended that the Pugnose Shiner be classified as classified as Threatened in Canada.

SPECIES INFORMATION

The Pugnose Shiner, *Notropis anogenus* Forbes 1885, (Fig. 1) is one of 83 species in the genus *Notropis* of the carp and minnow family Cyprinidae (Robins et al. 1991). Species in the genus *Notropis* can be distinguished from other genera in Cyprinidae by the presence of usually 8 dorsal rays, short intestine with 1 loop at front, scales on front half of side not much taller than wide (with a few exceptions), scales on nape about the same size as those on upper side (with a few exceptions), scales usually not appearing diamond-shaped, and pharyngeal tooth patterns of 0,4-4,0 to 2,4-4,2 (Page and Burr 1991).

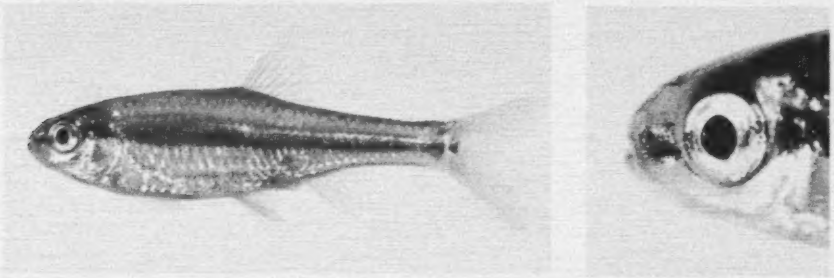

Figure 1. Pugnose Shiner, *Notropis anogenus*, from Mitchell Bay, June 1996. **A**: 46 mmTL. **B**: 44 mm TL, close up of anterior part of body showing small upturned mouth.

The Pugnose Shiner is a small silvery fish with pale yellow to olive tints on back. A dark lateral band extends anteriorly onto the snout (chin, lower lip, side of upper lip) and ends posteriorly as a dark often wedge-shaped spot on the caudal peduncle. Scales on the back are darkly outlined. The scale row above the black lateral band frequently lacks pigment. All fins are transparent and, unlike most *Notropis*, the peritoneum is black. The body is fragile, slender and fairly compressed. Its mouth is very small and upturned. Maximum total length is 60 mm for females and 50 mm for males. This

description is a compilation of diagnostic characters based on Bailey (1959), Scott and Crossman (1973), Becker (1983) and Page and Burr (1991).

Of the 15 species of *Notropis* collected in Canadian waters, the Pugnose Shiner is most similar to the Blackchin Shiner (*N. heterodon*) (Scott and Crossman 1973). The Pugnose Shiner was originally described by Forbes (1885) based on a collection of 24 specimens from the Fox River, Illinois (Bailey 1959). Of the eight remaining type specimens in the collection of the Illinois Natural History Museum, six are *N. anogenus* and two are *N. heterodon* exemplifying the similarity between the species (Scott and Crossman 1973). The two species can be distinguished by the very small, sharply inclined mouth that does not extend past the nostril in the Pugnose Shiner.

The Pugnose Shiner is also similar to the Pugnose Minnow (*Opsopoeodus emiliae*) and Bridle Shiner (*Notropis bifrenatus*) (Page and Burr 1991). The Pugnose Minnow has a small strongly upturned mouth; but, unlike the Pugnose Shiner, has typically 9 dorsal rays, dark areas on the dorsal fin, cross-hatched areas on the upper side, and a silvery-white peritoneum (Scott and Crossman 1973, Page and Burr 1991). Unlike the Pugnose Shiner, the Bridle Shiner has a larger, less upturned mouth, incomplete lateral line, 7 anal rays and silvery peritoneum (Scott and Crossman 1973, Page and Burr 1991).

Taxonomy

Class Actinopterygii (ray-finned fishes)
Order Cypriniformes (carps)
Family Cyprinidae (carps and minnows)
Common Name: Pugnose Shiner (English), méné camus (French)
Scientific name: *Notropis anogenus* (Forbes, 1885)

Relationships of the Pugnose Shiner are not known but Bailey (1959) hypothesized that its closest relative is *Notropis topeka* because it "shares many structural characters and bears strong resemblance". He also suggested that *N. ortenburgeri* and *N. bifrenatus* are perhaps related.

DISTRIBUTION

The Pugnose Shiner is found in the upper Mississippi River, Red River of the North, and Great Lakes basins (Figure 2). In the Mississippi drainage, it is found in several tributaries of the Mississippi River in Illinois, Wisconsin and Minnesota. It is found in the extreme (upper) Red River of the North drainage of Minnesota and North Dakota. In the Great Lakes drainage, it is found in tributaries of lakes Michigan and Huron, Lake St. Clair, western Lake Erie, eastern Lake Ontario and the upper St. Lawrence River. The centre of its Great Lakes distribution is Michigan with disjunct populations found in Illinois, Wisconsin, Ohio, New York and Ontario. It is now considered extirpated in Ohio (Trautman 1981).

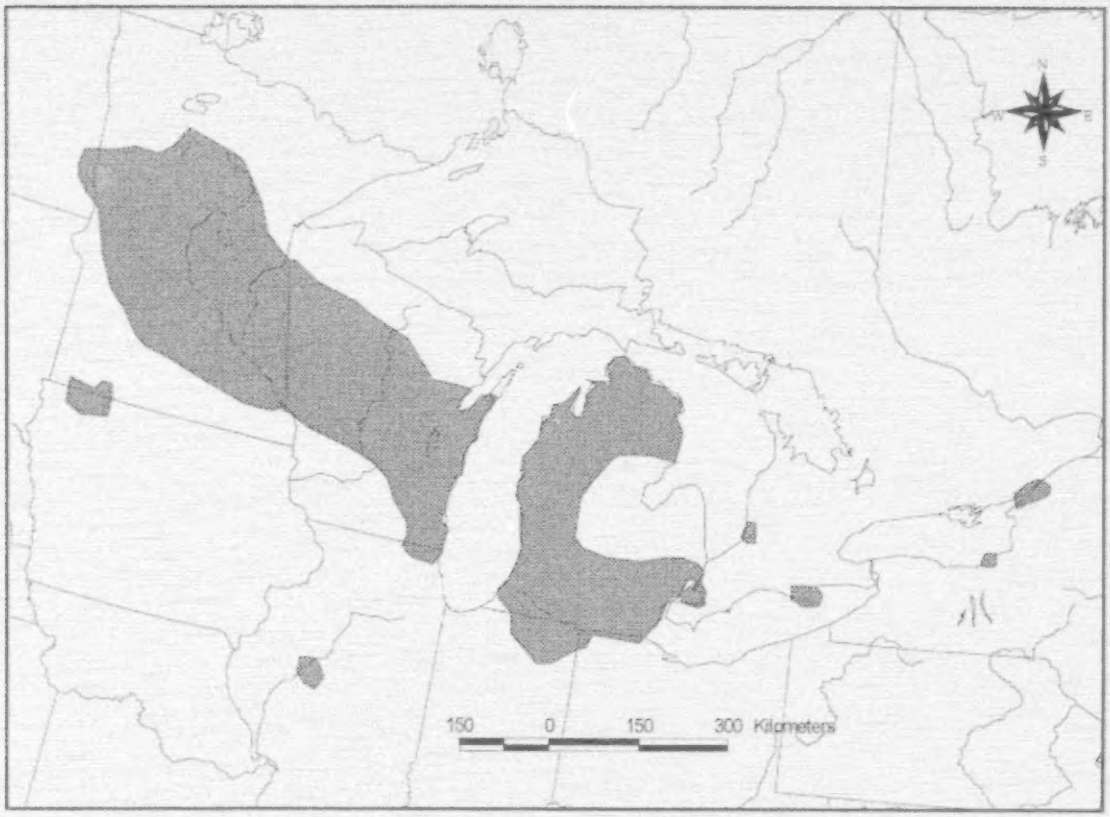

Figure 2. North American distribution of the Pugnose Shiner. Modified from Page and Burr (1991).

In Canada, the Pugnose Shiner has been collected only in Ontario (see Appendix 1). It is known from Lake St. Clair, the Old Ausable Channel (southern Lake Huron drainage), three disjunct areas of Lake Erie (Point Pelee, Rondeau Bay, Long Point Bay) and the St. Lawrence River between Eastview and Mallorytown Landing (Figure 3).

HABITAT

Scott and Crossman (1973) suggested that the Canadian range is probably diminishing due to its extreme sensitivity to turbidity and its requirement for clear water and heavily vegetated habitats with clean sand or marl bottoms.

In Ontario, the Pugnose Shiner is found in quiet areas of large lakes, stagnant channels, and large rivers primarily on sand bottoms with organic detritus. Water is usually clear although individuals have been caught in water with a secchi reading as low as 0.3 m (Lake St. Clair, ROM 43420). It is almost always found in association with

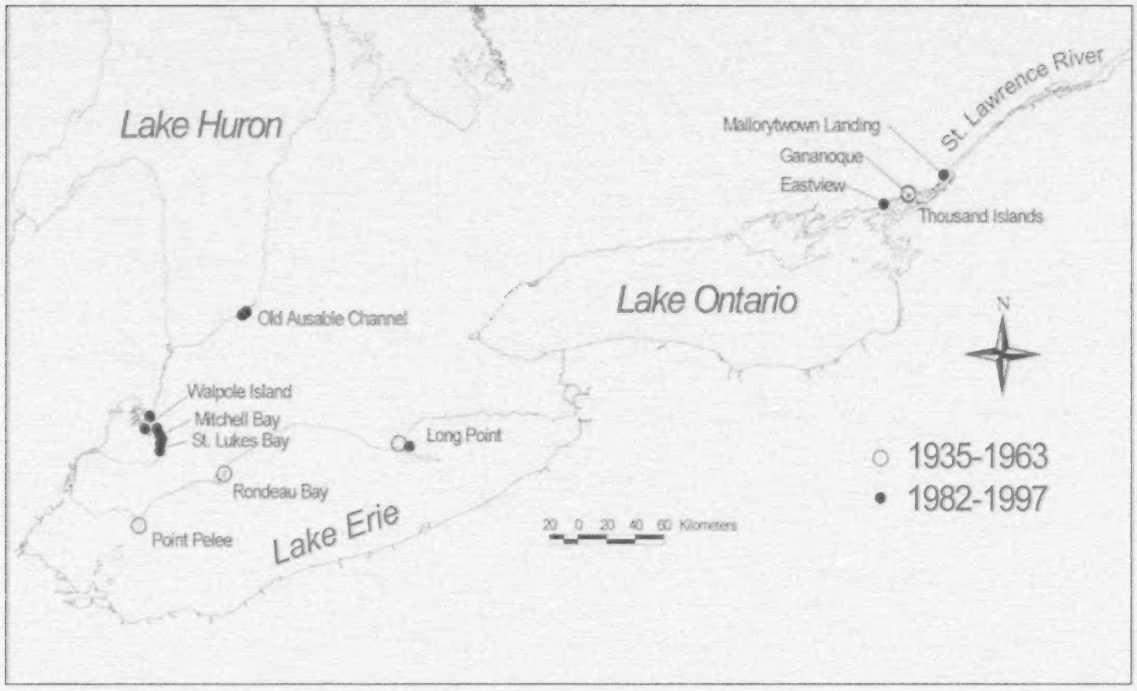

Figure 3. Canadian distribution of the Pugnose Shiner, 1935-1997. The species was not collected between 1963 and 1982.

aquatic vegetation, particularly *Chara* (Becker 1983, ROM unpublished data). It was captured on Walpole Island at 16 sites where it was found at a depth of up to 2.3 m over substrates containing muck and sand and occasionally silt and clay in areas that were usually heavily vegetated with submerged aquatic plants including *Chara, Vallisneria, Heteranthera, Myriophyllum, Najas, Potamogeton,* and *Elodea* (ROM unpublished data). The Walpole site and Lake St. Clair sites are not isolated from each other and likely constitute a single large population.

GENERAL BIOLOGY

Reproductive Capability

The pugnose shiner is a lithophil - a nonguarding, open substrate spawner — which probably spawns in early to mid-June in Ontario (Leslie and Timmins 2002). Becker (1983) summarized life history data of Wisconsin populations. Spawning was not observed, but based on appearance of gravid females, it occurred from mid-May into July at temperatures of 21-29°C. Gravid females had 530-1275 eggs but some of these may not have been laid.

Average sizes (total length in mm) at age on 8 August in a Wisconsin population were: age I (38-44, $\bar{x}$=42.0), age II (45-49, $\bar{x}$=46.3) and age III (52-53, $\bar{x}$=52.5) (Becker

1983). In Ontario, Leslie and Timmins (2002) found mean total length in age 0 fishes to be 24.1 mm.

Pugnose Shiners caught on 7 June 1996 in Mitchell Bay, Lake St. Clair were probably in the midst of spawning since some females appeared to be partially spent. Mature females were 41-56 mm TL (n=10) and mature males were 30-38 mm TL (n=10) (ROM, unpublished data).

Diet

Becker (1983) reported that, in Wisconsin, plants such as *Chara* and filamentous green algae (e.g., *Spirogyra*) were preferred over animal foods such as the cladocerans, *Daphnia* and *Chydorus*. Small leeches and trichopterans have also been observed in its diet (Carlson 1998).

Eight specimens from Mitchell Bay captured in June contained primarily small cladocerans (0.25-0.38 mm) of *Chydorus sphaericus* and *Bosmina longirostris*, two widespread and common species. One female individual of 43 mm TL contained an estimated 1210 *C. sphaericus* and 370 *B. longirostris* (ROM, unpublished data).

Species Movement

There have been no published studies on migration or size of home range in the Pugnose Shiner. It is likely that its small size and weak swimming ability limits its movement to small distances.

Behaviour Adaptability

The Pugnose Shiner requires aquatic vegetation, which provides cover, food and breeding sites (Becker 1983). Based on studies in the aquarium, this species is timid and secretive and would therefore be less susceptible to entrapment gear (Becker 1983). Its habit of staying near cover and going into hiding at any motion or disturbance would presumably also reduce its susceptibility to predation in comparison to the Blackchin Shiner, *Notropis heterodon,* with which it is commonly associated. Although it has a very small mouth it can consume food items up to 2 mm long and twice the length of the mouth (Becker 1983).

POPULATION SIZES AND TRENDS

No studies examining population size and trends have been conducted on the Canadian population of the Pugnose Shiner. However, recent collections of Pugnose Shiner in Canada at five localities indicate reproducing populations are established. It was first collected in Ontario in 1935 in the St. Lawrence River near Gananoque (Toner 1937). It was last recorded at this site in 1937, but was recently collected at a site east (1989; Royal Ontario Museum (ROM) 59737, 28 specimens) and a site west (1994;

ROM 69271, two specimens) of the original site. In Lake Erie, it was collected at Point Pelee in 1940 and 1941, in Rondeau Bay in 1940 and 1963, and in Long Point Bay in 1947 and 1996. As all known capture localities were sampled in 1979 (Parker et al. 1987), and in the 1980's and 1990's (ROM unpublished data. data), it is probable that only the Long Point population still exists. The Canadian Lake St. Clair and Ausable Channel populations were first discovered in the early 1980's. In Lake St. Clair, small numbers of Pugnose Shiners were collected in St. Lukes Bay only in 1983, while it was collected in Mitchell Bay in 1983 and 1996. In 1999, 281 pugnose shiners were captured in the delta channels and freshwater coastal marshes of Walpole Island located at the north end of Lake St. Clair (ROM unpublished data). In 1983, 89 Pugnose Shiners were collected in the Old Ausable Channel, and 33 were collected in 1997. Therefore, it is probable that populations still exist in the St. Lawrence River, in Long Point Bay of Lake Erie, Lake St. Clair and the Old Ausable Channel.

The lack of Canadian records for 1947-1963 and 1963-1983 is likely the result of lack of large lake and river sampling, the small size of the species, and incorrect field identification.

Bailey (1959) documented the Pugnose Shiner from 89 sites in its entire range as follows: Minnesota (29), Michigan (27), Wisconsin (14), Ontario (5), Iowa (3), New York (3), Illinois (3), Ohio (2), Indiana (2) and North Dakota (1). More recent surveys have documented the Pugnose Shiner at new sites but most of these studies suggest that it was extirpated from some early sites (see Appendix 2). Declines have apparently occurred in Minnesota (Hatch et al. in press, Koel and Peterka 1998), New York (Carlson, 1998), Michigan (Latta 1998) and North Dakota (Koel and Peterka 1998). In Wisconsin, the number of occurrences of the Pugnose Shiner increased in later surveys (1974-1986) compared to early surveys (1900-1972). Although the sampling effort in the later surveys was higher, the frequency of occurrences at sampled sites remained unchanged at 0.6% (Fago 1992). However, it has not been recorded from several early sites and its trend in Wisconsin is uncertain (Becker 1983; J. Lyons, Wisconsin Department of Natural Resources (WDNR), personal communication).

Pugnose Shiners were collected in Lake St. Clair in 2001 (ROM, unpublished data). In 2002, five of the six known locations of Pugnose Shiner were sampled. Pugnose Shiners were collected in Lake St. Clair (ROM, unpublished data) and the Old Ausable Channel [42 specimens, Department of Fisheries and Oceans (DFO), unpublished data]. Despite intensive sampling at over 100 sites using a variety of gears, Pugnose Shiners were not collected at Point Pelee, nor were they collected using less intensive sampling in Long Point Bay and Rondeau Bay (DFO, unpublished data). Only the St. Lawrence location was not sampled in 2002.

LIMITING FACTORS

Previous authors (e.g., Bailey 1959, Trautman 1981) attributed the decline of the Pugnose Shiner to turbidity and the removal of aquatic vegetation. Loss of habitat from

shore development and destruction of native littoral-zone macrophyte communities probably caused the extirpation of the Pugnose Shiner from two lakes in southern Wisconsin (J. Lyons, WDNR, personal communication).

Turbidity and aquatic plant removal may also be contributing to its decline in Canada, but evidence from Point Pelee suggests that other factors may be involved. Parks on Point Pelee and Rondeau Bay that would presumably offer protection from habitat changes (Parker et al. 1987) have failed to prevent its decline or extirpation. Although Point Pelee experiences periodic turbidity in rough weather, we found water generally clear with an abundance of a variety of aquatic plants. In these areas, a factor that may have contributed to the decline of the Pugnose Shiner is an increase in the number and diversity of predators. There is evidence that minnow diversity and abundance decreases with an increase in numbers and diversity of littoral predators such as basses (*Micropterus* spp.) and pikes, (*Esox* spp.), (Whittier et al. 1997). Although the northern pike (*Esox lucius*) and grass pickerel (*E. americanus vermiculatus*) were known to occur at Point Pelee in the 1940s, potential predators such as largemouth bass (*Micropterus salmoides*), warmouth (*Lepomis gulosus*) and black crappie (*Pomoxis nigromaculatus*) were not recorded prior to 1958. However, the Pugnose Shiner was found in association with a wide variety of potential predators in 1999 at Walpole Island where it is relatively common (ROM unpublished data). These were frequently abundant and included bowfin (*Amia calva*), longnose gar (*Lepisosteus osseus*), northern pike, grass pickerel, bullheads (*Ameiurus* spp), rock bass (*Ambloplites rupestris*), largemouth bass, black crappie and yellow perch (*Perca flavescens*).

Another factor that could have played a role in the decline or extirpation of the Pugnose Shiner at Point Pelee was an increase in competition for resources with species such as the Bluegill (*Lepomis macrochirus*), juvenile Black Crappie, and Brook Silverside (*Labidesthes sicculus*). These species feed heavily on cladocerans and to some extent on plant material and did not appear in collections until 1958. However, Brook Silversides and juveniles of Bluegill and Black Crappie occurred together with Pugnose Shiners in 1999 collections at Walpole Island (ROM unpublished data)

Most of the Canadian habitat of this species has been affected by the introduced zebra mussel (*Dreissena polymorpha*) and quagga mussel (*Dreissena bugensis*). Their effect on the Pugnose Shiner is unknown, but it is possible that the increased water clarity and macrophyte proliferation associated with these invasive species may benefit this species.

Changes in the aquatic plant community on which the species depends could also have played a role. The extirpation of the Pugnose Shiner and seven other fish species in one lake in Wisconsin was associated with the introduction and explosive increase of Eurasian Water Milfoil, *Myriophyllum spicatum* (Lyons 1989). Eurasian Water Milfoil occurs at Point Pelee but it is not known with certainty when this species became established there. There is a record of Eurasian Water Milfoil from Point Pelee in 1961 but its identification has not been verified. In the St. Clair - Detroit River system it was

first recorded in 1974 and by 1978 was the fourth most common submerged macrophyte (Schloesser and Manny 1984, M. Oldham, Ontario Natural Heritage Information Centre, personal communication).

Leslie and Timmins (2002) hypothesized that the isolated nature of preferred habitat in Lake Erie probably prevents connectivity of fragmented populations. This fragmentation likely prevents gene flow between between existing populations, and may inhibit (re)colonization of other suitable habitats.

SPECIAL SIGNIFICNCE

Little is known of the ecological role of the rare Pugnose Shiner. Its strict habitat requirements make it a good indicator of environmental quality (Smith 1985).

PROTECTION

Conservation ranks determined by the Association of Biodiversity Information are summarized in Table 1.

Table 1. Global, American and Canadian federal, and state and provincial ranks assigned by NatureServe (2002).

Global	G3
USA	N3
Canada	N2N3
State/Provincial	Illinois (S1), Indiana (S1), Iowa (S1), Michigan (S3), Minnesota (S3), New York (S1), North Dakota (S1), Ohio (SX), Wisconsin (S2S3), Ontario (S2)

Canada

The original COSEWIC report determined the status to be Rare (Parker et al. 1987). In 1997, it was officially listed as "Threatened" in Ontario, which is the only province where it is found (A. Dextrase, Ontario Ministry of Natural Resources, personal communication). Although, no specific current legal protection exists for the Pugnose Shiner in Canada, the Threatened designation recommended in this report will afford protection to the species and its habitat under the proposed Canada Species at Risk Act.

The species and/or its habitat may also be protected by the Canada Environmental Assessment Act, Canada Environmental Protection Act, Canada Fisheries Act, Canada Water Act, Canada Wildlife Act, Ontario Environmental Protection Act, Ontario Environmental Assessment Act, Ontario Planning Act and Ontario Water Resources

Act. The Ontario Conservation Land Tax Incentive Program may indirectly conserve the habitat of this species where it occurs in provincially significant wetlands such as those on the east shore of Lake St. Clair (D. Hector, Ontario Ministry of Natural Resources, personal communication).

United States

Johnson (1987) listed the Pugnose Shiner as protected in Iowa, Illinois, New York and of Special Concern in North Dakota, Wisconsin and Ontario. In Minnesota, it is designated as Special Concern (Hatch et al. in press). In Wisconsin, it was downlisted to Watch Status (Fago 1992).

EVALUATION AND SUMMARY OF STATUS

The Pugnose Shiner is at its northeastern range limit in Canada. It was recently found in the Old Ausable Channel, Lake St. Clair, Lake Erie and the St. Lawrence River. Although additional sampling is required to determine the stability, size and range of the population, it appears that reproducing populations are still present in limited areas of these waters. As it is not known why this species is declining in Canada, it is difficult to determine how to protect this species, or if populations will persist if its habitat is not significantly altered.

The Pugnose Shiner was recorded from only six areas in Canada. It is now found at only four of these. It is rare and has experienced decline in many areas throughout its entire range. Therefore, it is recommended that its status be upgraded from Vulnerable to Threatened.

TECHNICAL SUMMARY

Notropis anogenus
Pugnose Shiner Méné Camus

Distribution

Extent of occurrence	< 30,000 km^2
Area of occupancy:	< 20 km^2
Habitat trend	decline in extent and quality of habitat

Population Information

Number of mature (capable of reproduction) individuals in Canadian Population:	Unknown
Generation Time:	2 years
Population trend:	declining
Rate of decline:	Unknown
Number of populations within Canada:	4
Is population fragmented?	Yes
Number of individuals in each sub-population	Unknown
Number of extant locations:	4
Number of historic locations from which the species has been extirpated	2
Does the species undergo fluctuations?	No

Threats

Increasing turbidity and removal of aquatic vegetation resulting from shore development and agriculture and urban development.

Changes in the aquatic plant community on which the species depends has been limiting in some areas.

Rescue Potential

Does the species exist elsewhere?	Yes, but neighboring U.S. populations are also declining
Is immigration known or possible?	Unlikely
Is suitable habitat available for immigrants	Yes, but in Decline
Would immigrants survive in Canada?	Yes

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